

## **REMARKS**

As noted above, the Applicant appreciates the Examiner's thorough examination of the subject application.

Claims 1-20 are pending in the subject application. In the final Office Action mailed 17 November 2010, claims 1-20 were rejected on various statutory grounds, as described in further detail below.

Claims 1 and 11 are amended herein for clarification of Applicant's invention. Claim 1 has been amended to include limitations of claim 7, which is canceled without prejudice. Claim 6 is amended for consistency with amended claim 1. Claim 8 has been amended to depend from claim 1 rather than claim 7, and to recite that the optical head array includes auto-focus and servo-tracking functionality. Claims 1 and 11 are amended to include subject matter of claim 14, which is canceled without prejudice. Claim 11 is amended to further recite "wherein the radiation comprises light of a suitable wavelength" Claim 11 is also amended to recite that "removing the linear polymer layer from the drum" occurs "after hardening by application of radiation." Claims 8 and 15-16 have been amended to replace "optical recording" with "optical recordable." Claims 1-6 and 8-10 are also amended in the respective preamble to recite a system rather than apparatus. Claims 19-20 are amended to insert "optical" before "recordable." The amendments are supported by the original disclosure, e.g., paragraphs [0018], [0047], [0049], [0050], [0055]-[0056], FIG. 1, and the original claims of the application as filed, and also one of the priority documents, i.e., U.S. Provisional Patent Application No. 60/538,120, which is incorporated by reference into the subject application. No new matter has been added.

Reconsideration and further examination of the subject application is respectfully requested in view of the foregoing amendments and the following remarks.

### ***Interview Summary under 37 CFR § 1.133***

The Applicant and Applicant's attorney thank the Examiner and the Examiner's Supervisor for holding a telephonic interview on 16 March 2011 for the purposes of discussing

the Applicant's claims and the cited prior art. Examiner Rivera, Supervisory Examiner Wyrozebski, attorney McCloskey, Diane Martin (legal counsel for Applicant), and Dennis Slafer (named inventor and CEO of Applicant) participated in the interview. Agreement was not reached during the interview regarding the patentability of all the pending claims.

During the interview, independent claims 1 and 11 were discussed, as were the following prior art references applied for the previous rejection of claims under 35 U.S.C. § 103(a): U.S. Patent No. 4,836,874 to Foster ("Foster"); International Application No. PCT/IB96/00995 to Norden et al. ("Norden"); and, U.S. Patent No. 6,122,519 to Takakuwa et al. ("Takakuwa").

Inventor Slafer explained that Foster teaches (i) use of a radiation absorbing dye that is mixed with a solvent and applied to a protective film, and (ii) that a laser is used to heat (facilitated by absorption by the dye) and melt the protective film, forming desired projections for a compact disc. Inventor Slafer explained that this process of Foster was opposed to the process of the claimed invention in which light radiation (infrared, visible, and/or ultraviolet) is used to cure or harden a polymer layer that had previously been softened. It was suggested that such a clarifying amendment be placed in the claims. The Examiners seemed to agree that such an amendment could distinguish the claims over Slafer in combination with Norden.

Inventor Slafer explained that Norden did not teach re-writable media but only read-only memory ("ROM") media. Inventor Slafer further explained that the Norden taught away from phase-change media by describing such in the background section as having problems associated with a purported inherent disadvantage, namely that they must be inscribed in real time. Inventor Slafer further explained that Norden teaches application of solvents, such as acetone, alcohols, ethers, and esters, to the registration layer and that one skilled in the art would appreciate that directing a high-intensity laser output (as taught by Foster) to a registration area having such a solvent would either cause combustion, due to the low flashpoint temperatures of such chemicals, and/or embossing defects due to vaporization of the chemical causing gas bubbles to form between the registration layer and surrounding materials. A reference describing the material data safety sheet (MSDS) for acetone was described as teaching high flammability for the chemical.

Inventor Slafer discussed Takakuwa and explained that while Takakuwa was cited by the Office Action for teaching laser cutting, Takakuwa does not teach or suggest the optical heads described in the subject application. The optical heads described in the application include auto-focus and servo-tracking features.

Also discussed was the previous rejection of the claims under 35 U.S.C. § 112, first paragraph, for alleged lack of support for the limitation “an elongated linear polymer layer with a thickness of about 4  $\mu\text{m}$  to about 275  $\mu\text{m}$ .” Noting that the specification describes that the claimed “pre-formatted optical data storage tape is characterized by a thin (in the approximate range of 4 microns to 1000 micron), elongated tape-like substrate,” the Applicant’s attorney explained that the proper inquiry for determining compliance with the written description requirement of 35 U.S.C. § 112, first paragraph, is whether one skilled in the art could derive the claimed ranges from the disclosure and cited *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (holding that a range of a solid concentration “between 35% and 60%,” while not explicitly described in the specification, was nevertheless supported by the explicit description of a range of “25% to 60%”). It was submitted by the Applicant that the fact pattern of *In re Wertheim* is directly analogous on this point to the Applicant’s claimed sub-range of thicknesses for the linear polymer layer. The Examiners disagreed and instead stated that specific examples within the overall described range were required.

After specifically traversing the Examiners’ interpretation of *In re Wertheim*, the Applicant’s attorney noted that priority document, U.S. Provisional Patent Application No. 60/538,120, which is incorporated into the specification of the subject application by reference, clearly states that “[t]he storage medium described herein is characterized by a thin (in the approximate range of 4 microns to 100 micron), elongated tape-like substrate.” Agreement was reached by the Applicant and the both Examiners that the range of “about 4  $\mu\text{m}$  to about 100 microns” was supported by the original disclosure, e.g., by way of the noted priority document, which is incorporated into the subject application by reference.

### ***Claim Rejections – 35 U.S.C. § 112***

Claims 1-20 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. More specifically, the rejection alleged that support did not exist for the linear polymer layer thickness within the specific range of 4 microns to 275 microns, as recited in independent claims 1 and 11. In particular, the Office Action stated “[s]pecifically, thickness of 275 microns is not explicitly disclosed in the specification therefore it is considered new matter.” Office Action, page 2, item 3. Applicant traverses the rejection, and without acceding to the propriety of the rejection, submits that the present amendment to the claims renders the rejection as moot.

Applicant notes that independent claims 1 and 11 are amended to recite that the linear polymer layer thickness is in the range of “about 4  $\mu\text{m}$  to about 100  $\mu\text{m}$ .” Applicant also notes that the priority document, i.e., U.S. Provisional Patent Application No. 60/538,120, clearly states that “[t]he storage medium described herein is characterized **by a thin (in the approximate range of 4 microns to 100 micron), elongated tape-like substrate.**” [Emphasis added] See page 2, first paragraph.

For at least the foregoing reasons, Applicant therefore submits that the rejection of claims 1-20 under 35 U.S.C. § 112, first paragraph, should be withdrawn.

### ***Claim Rejections – 35 U.S.C. § 103***

#### **Claims 1, 2, 4-7, 9, 10, and 20**

Claims 1, 2, 4-7, 9, 10, and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,836,874 to Foster (“Foster”). Applicant traverses the rejection and requests reconsideration for the following reasons.

The independent claim subject to the instant rejection, i.e., amended claim 1, recites the following:

1. A system for manufacturing pre-formatted thin tape linear optical data storage media including an elongated linear polymer layer **with a thickness of about 4  $\mu\text{m}$  to about 100  $\mu\text{m}$  and an optical recordable layer**, the system comprising:

a drum configured to receive the elongated linear polymer layer and for rotation about a rotation axis, and including a circumferential outer surface and a predetermined pattern of protrusions for embossing at least one pattern of optically readable embossments in an elongated linear polymer layer rolled on the drum;

**one or more deposition sources configured to apply an optical recordable layer covering the pattern of optically readable embossments of the elongated linear polymer layer**; and

a radiation source configured to cause the pattern of optically readable embossments of the elongated linear polymer layer to solidify prior to the embossments being removed from the protrusions of the outer surface of the drum, **wherein the radiation source is a light source**.

[Emphasis Added]

In contrast, Foster teaches making **read-only memory** (ROM) discs (CD's, etc.). Foster does not disclose optical tape recording. Foster addresses making CD-type (i.e., discrete) optical media, which is significantly thicker than tape and requires a thick cover sheet. Moreover, the optical tracks taught by Foster are closed (spiral or concentric) **and not "continuous"** as would be the case for optical tape used/processed with Applicant's claimed invention. Additionally, Foster's process is a thermal embossing process that uses laser/light energy to heat a substrate after lamination **to melt and deform the substrate** for embossing. Foster does not disclose or suggest using a radiation source (e.g., producing UV or IR) to cure and harden a liquid layer.

The Office Action states that Foster teaches use of dispenser, with "the liquid being a polymer material (col. 4 lines 54-63) that is hardened by a focused laser beam in the orange-red..." In response, **Applicant notes that the fluid disclosed by Foster (methylene blue) is NOT a polymer, it is an organic dye**. The Foster laser does NOT harden but does the exact opposite—it **softens** the film in order for the film to flow into the pits.

Thus, Foster fails to teach (or suggest) each and every limitation as arranged in amended claim 1, which is the base claim for the claims under rejection. Accordingly, Foster forms and improper basis for a rejection of claims 1, 2, 4-7, 9, 10, and 20 under 35 U.S.C. § 103(a). Applicant respectfully requests that the rejection be removed accordingly.

Claims 3 and 11-19

Claims 3 and 11-19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Foster, cited previously, in view of International Patent Application Publication No. WO 97/14142 to Norden ("Norden") as evidenced by U.S. Patent No. 5,627,817 to Rosen et al. ("Rosen"). Applicant traverses the rejection and respectfully requests reconsideration for the following reasons.

Amended independent claim 11, the base claim of claims 12-19, recites the following:

11. A method for manufacturing pre-formatted linear optical data storage media including an elongated linear polymer layer and an optical recordable layer, the method comprising:

**softening a surface of an elongated linear polymer layer with a thickness of about 4  $\mu$ m to about 100  $\mu$ m;**

embossing at least one pattern of optically readable embossments in the softened surface of the elongated linear polymer layer using a drum having protrusions on an outer surface;

**applying an optical recordable layer covering the pattern of optically readable embossments of the elongated linear polymer layer;**

**applying radiation to the elongated linear polymer layer, wherein the radiation comprises light of a suitable wavelength;**

**by application of the radiation, causing hardening of the embossed surface** of the elongated linear polymer layer; and

**after hardening by application of radiation,** removing the linear polymer layer from the drum.

[Emphasis added]

The deficiencies of Foster relative to claim 1, the base claim of claim 3 are described above. Foster is similarly deficient with respect to claim 11; in addition, Foster's process is quite different from Applicant's method of claim 11 in at least one other regard: **Foster requires a very complex and expensive high-powered gas laser with attendant optics to heat and thus soften and deform the polymer film.** This is very different than applying radiation to **harden** a polymer layer, e.g., using a common heat lamp or UV lamp, as recited in Applicant's claims. Thus, Applicant's claims are patentably distinguishable over Foster.

Norden, described in Applicant's previous papers, is directed to methods of manufacturing **read-only optical media** and is not understood as curing the deficiencies noted previously for Foster relative to claim 1 or claim 11. At the very least, Norden fails to teach (or suggest) **using a phase-change layer or other recordable layer for embossing writable optical storage media** (i.e., media that can be written to and erased), as recited in amended independent claim 1.

Moreover, one skilled in the art would appreciate that **Norden teaches away from combination with Foster.** Using Norden's solvent with Foster's high power laser would lead to dangerous results, since the laser's high energy density would instantly vaporize any residual solvent, badly distorting the polymer layer at best, and possibly igniting the solvent (once raised above the ignition temp) at worst. Additionally, Norden actually describes deficiencies with prior art phase-change layers. See Norden, page 2, line 29 through page 3, line 2.

For the rejection of claims 14, the Office Action states "...where the reflection layer ensures that, when the registration side..., which would intrinsically classify this layer as **an optical recording layer.**" Applicant respectfully traverses this statement, and submits that the phrase "optical recording" or "optical recordable" as used in the art means the user writing (or altering) his or her own data onto an optical disc that can be written to or erased and re written. ROM cannot be an optical recording medium by definition, i.e., read-only memory.

Rosen is directed to a multiple data-layer dye-based optical disk drive. See, e.g., Rosen, col. 2, lines 27-30. Rosen is not understood as curing the deficiencies described for Foster and Norden relative to Applicant's claims 1 and 11.

Consequently, Applicant submits that the rejection of claims 3 and 11-19 under 35 U.S.C. § 103(a) over Foster in view of Norden and Rosen is improper. Applicant respectfully requests that the rejection be removed accordingly.

#### Claim 8

Claim 8 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Foster in view of U.S. Patent No. 6,162,519 to Takakuwa et al. ("Takakuwa"). Applicant traverses the rejection and requests reconsideration for the following reasons.

Applicant notes that claim 8, has been amended to include **"wherein the optical head array includes auto-focus and servo-tracking functionality."**

The deficiencies of Foster relative to amended claim 1, the base claim for claim 8, have been described previously.

The secondary reference, Takakuwa, is directed to optical discs that are made from polyolefin polymers and related methods for making such discs. See, e.g., Takakuwa, col. 2, lines 17-26. The objective of Takakuwa appears to be improved birefringence using polyolefin substrates. Polyolefin films, however, are not stable in thin gages (e.g., they possess a taffy-like character. While Takakuwa is cited as teaching a method of writing recording marks using a laser cutting machine with a pattern based on desired data, such is not what is recited in Applicant's claims, e.g., claim 8. There is a significant difference between Takakuwa's "laser cutting machine" and Applicant's claimed optical head array. Takakuwa, in col. 13, lines 12-14, is not referring to a pattern replication process, but rather is referring to a typical laser beam recorder that is used as the mastering lathe in a CD/DVD mastering operation. Such a laser-based machine is typically a multimillion-dollar machine that is massive, cuts "open-loop" patterns (does not use pre-formatted tracks), requires climate controlled class-100 environment, and has a



very extensive support infrastructure. Applicant's claimed invention, on the other hand, is a mechanical mass-reproduction machine/process designed to produce very inexpensive copies of complex and expensive patterns such as made by the laser beam recorder described by Takakuwa.

At the very least, Takakuwa is not understood as curing the deficiencies not previously for Foster with respect to claim 1 nor as teaching or suggesting "**wherein the optical head array includes auto-focus and servo-tracking functionality.**"

Thus, the combination of Foster and Takakuwa, whether the references are considered alone or in combination, form an improper basis for a rejection of claim 8 under 35 U.S.C. § 103(a). Applicant therefore asks that the rejection be withdrawn accordingly.

### ***Response to Arguments***

The Office Action provided a number of remarks in response to arguments submitted in Applicant's previous paper (Amendment of 27 October 2010). The Applicant responds as follows.

Foster teaches that its invention requires laser energy focused as a linear beam extending axially across the roller to locally heat and deform the film to flow into the pits and assume complementary configuration. *See* Foster, col. 4, lines 38-54.

Applicant's claimed invention is an improvement over the Foster process in that it (i) eliminates the need for applying an energy-absorbing region or chemical (such as dye) to the film, (ii) eliminates the need for a laser, (iii) eliminates the need for beam expanding optics, (iv) eliminates need for alignment and maintenance of optics and laser, and (v) eliminates the requirement to heat the film to its melting point.

The disadvantages to Foster's thermal embossing include temperature cycling of the film (which is bad for sensitive materials), mechanical stress on embossing drum from repeated hot-

cold cycles every revolution, and slow line speed due to need to cool film before removing from drum.

Applicant's claimed invention is major improvement because a liquid monomer can be applied to the film and can be hardened virtually instantaneously at room temperature by a lamp (incoherent) producing any suitable radiation that cures the monomer. The Applicant's claimed invention does not require heat cycling, and can run very fast line speeds because the film that is processed does not need to be cooled. Furthermore, the radiation source used for the claimed invention can be inexpensive, not requiring significant alignment or maintenance.

The Office Action apparently misconstrues Foster's process (see Office Action, page 16, item 42):

Regarding that Foster does not disclose or suggest that the radiation source to cure and harden a liquid layer Foster clearly shows in Figure 1 that the embossed substrate (item 24) being pulled away from the master roll (item 12) after being irradiated by the laser (item 36) which would require for the substrate to be harden [sic] in order to properly be separated from the master roll.

The Applicant disagrees with such a characterization of Foster. The laser disclosed by Foster heats and melts the Foster polymer, which then slowly cools of its own accord and is then pulled off the master roll. The laws of thermodynamics (heat flow) govern how fast the heat can leave the film, and since active cooling is not taught by Foster, then heat flow will limit the process speed. The Examiner seems to infer that, because the pattern is shown at the point the film is pulled off the master, some sort of curing must have taken place; no such curing is, however, taught or suggested by Foster. Thus, the Applicant submits that impermissible hindsight analysis was employed for the rejection.

At page 18, item 46, regarding claim 18 and the Applicant's previous argument that Norden teaches away combination with Foster, the Office Action stated the following:

Such argument is unfounded since Foster is silent to the amount of energy used by the laser or the amount of time the substrate is exposed to the laser in order to

state that such problems would occur if the chemicals used by Norden are applied in the method of Foster.

Applicant respectfully submits that such a statement is erroneous.

Foster plainly states “[t]he laser beam heats the inner dyed contact region 48 **very rapidly and intensely, and in a very localized area...**” [Emphasis added] See Foster, col. 5, lines 3-6.

Applicant submits that a polymer must be heated above its Tg (glass transition temp) to melt and flow. This temperature is typically >125° C. To combine this with a solvent of Norden (e.g., acetone, as disclosed by Norden at col. 5, lines 27-28) is a recipe for disaster, as one skilled in the art would fully appreciate.

A common reference, <<http://www.jtbaker.com/msds/englishhtml/A0446.htm>>, provides the following for the material data safety sheet (MSDS) for acetone:

The most common hazard associated with acetone is its extreme flammability.... At temperatures greater than acetone's flash point of -20 °C (-4 °F), air mixtures of between 2.5% and 12.8% acetone, by volume, may explode or cause a flash fire. Vapors can flow along surfaces to distant ignition sources and flash back. Static discharge may also ignite acetone vapors.

[downloaded 15 March 2011]

The ethers, esters, alcohols also mentioned by Norden present similar risks.

Regarding the remarks at item 47, page 18, of the Office Action concerning Takakuwa, the Applicant submits that Takakuwa describes a process for SERIALY writing write on a NON PRE-FORMATTED photoresist-coated silicon wafer. Takakuwa requires a silicon wafer substrate, spin coating photoresist, serially writing (1 bit at a time) a pattern, chemical development of resist, and chemical or plasma etching of the pattern to form a master pattern in silicon. This is “disk-at-once” method and ALL data must be written at once. The finished substrate is very brittle and fragile. **The disk cannot be read in a optical disk player, nor can it be read.** It cannot be formed into a drum. It is ONLY good for being a master disk, as Takakuwa teaches, and is thus not seen as being applicable to Applicant’s claimed invention.

The other claims currently under consideration in the application are dependent from their respective independent claims discussed above and therefore are believed to be allowable over the applied references for at least similar reasons. Because each dependent claim is deemed to define an additional aspect of the invention, the individual consideration of each on its own merits is respectfully requested. The absence of a reply to a specific rejection, issue, or comment does not signify agreement with or concession of that rejection, issue, or comment. In addition, because the arguments made above may not be exhaustive, there may be other reasons that have not been expressed for patentability of any or all claims of the application. Finally, nothing in this paper should be construed as an intent to concede, or an actual concession of, any issue with regard to any claim, or any cited art, except as specifically stated in this paper, and the amendment or cancellation of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment or cancellation.

### ***Conclusion***

For the foregoing reasons, Applicant submits that all of the claims under consideration in the subject application are in condition for allowance. A timely Notice of Allowance for the application is therefore earnestly solicited.

Should any questions arise, the Examiner is invited to call the undersigned.

Authorization is hereby given to charge our deposit account no. 50-1133 for any fees required for the prosecution of the subject application.

Respectfully submitted,

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